HIGH-RESOLUTION ORBITRAP MASS SPECTROMETRY SCREENING OF PESTICIDES RESIDUES IN THE BELGIAN PART OF THE NORTH SEA

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Pesticides are widely used in agriculture and livestock farming for plant protection and improving productivity. Yet, many of these chemicals are reported to have (eco)toxicological effects and are thus of major concern for nontarget organisms [1]. Moreover, run-off from agricultural lands and insufficient removal through wastewater treatment have led to their ubiquitous distribution in the aquatic environment [2]. In contrast to freshwater, the marine environment – being the final sink for most waters – has been studied noticeably less, especially the coastal and offshore areas of the Belgian Part of the North Sea (BPNS). As result of ultra-trace concentrations prevailing in the marine environment, suitable sample preparation procedures and highly sensitive analytical techniques are of utmost importance.

Therefore, the goal of the current study was to investigate the occurrence of 28 pesticides (fungicides, herbicides and insecticides) in the BPNS using a newly developed large-volume solid-phase extraction (SPE) method combined with full-scan UHPLC-Q-Orbitrap high-resolution mass spectrometry. The latter offers the added value of detecting known target analytes as well as retrospective data-screening to a larger set of initially non-targeted compounds. The BPNS was investigated by collecting triplicate grab samples during 2 samplings in winter and spring 2017, at 3 locations (harbour and open sea at Zeebrugge, harbour of Oostende).

The higher up-concentration of the novel large-volume Speedisk extraction allowed to achieve lower detection limits than with common SPE procedures. Targeted analysis of the seawater samples revealed the presence of up to 19 pesticides with concentrations ranging between 0.1 and 65 ng L^{-1}. Although banned or severely restricted by the EU, several of these pesticides were still abundantly found including some neonicotinoid insecticides comprised in the EU Watch List, *i.e.* clothianidin, imidacloprid, thiacloprid and thiamethoxam. As such, the current work adds to the limited knowledge on the occurrence of pesticides in the marine environment, specifically in the BPNS. The developed analytical method may constitute as an important tool for legislative frameworks aiming the monitoring of pesticide contamination in the environment.

REFERENCES
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